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PHOTOSYNTHESIS AND RESPIRATION OF THE CYANOBACTERIUM-CONTAINING SPONGE, *DYSIDEA HERBACEA*. *Memoirs of the Queensland Museum 44: 238. 1999*:- Marine sponges containing cyanobacterial endosymbionts are common in tropical waters, and the dictyoceratid sponge, *Dysidea herbacea*, is one of the most abundant sponges in the shallow lagoon at One Tree Reef, Great Barrier Reef. This sponge contains large numbers of the filamentous cyanobacterium, *Oscillatoria spongeliae*. The *O. spongeliae* trichomes are located free in the sponge mesohyl, although they are often in contact with archaeocytes. The high biomass of the cyanobacteria is illustrated by the chlorophyll *a* content of the association, which is about 335µg.mL^{-1} sponge volume, or 180.3µg.g^{-1} sponge wet weight. These values are much higher than for any other sponges so far studied.

Photosynthetic and dark respiration rates were measured using an oxygen electrode in summer and winter at ambient lagoon temperatures and at saturating irradiances. The compensation point for photosynthetic O_2 production is reached at about 30-50µmol photons.m^{-2}.sec^{-1} and photosynthesis saturates at about 300µmol photons.m^{-2}.sec^{-1}. No seasonal differences in the photosynthetic and respiration rates could be detected indicating that the sponge adapts to changing environmental conditions. The *D. herbacea/ O. spongeliae* association, does however respond to changes in temperature, with a Q_{10} for photosynthesis of about 5. Photosynthesis and respiration rates are also sensitive to the O_2 concentration in the seawater. The implications of these results for the ecology of this symbiotic association will be discussed. ❐ *Porifera, Dictyoceratida, cyanobacterium, symbiosis, photosynthesis, respiration, temperature.*

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